CONSTRUCTION SPECIFICATION

MI-130. WELL

1. SCOPE

This specification applies to drilled, driven and dug wells developed to supply water from an underground source. It does not include pumps installed in the well, or above-ground installations such as pumping plants, pipelines or tanks.

All wells shall comply with state water laws and regulations. Wells at recreation sites shall comply with applicable regulations of the State Department of Health, or other state and county agencies having jurisdiction.

2. CASING AND MATERIALS

Wells shall be cased, except that the lower sections of a well passing through consolidated strata do not require casing.

Casing materials may be pipe made of steel, wrought iron, plastic, copper, asbestos-cement, concrete or other similar material of equivalent strength and durability.

New metal pipe or new plastic pipe shall be used for well casing in drilled wells. New metal pipe only shall be used for driven wells.

Polyvinyl chloride plastic well casing shall be Schedule 40 or Schedule 80 pipe and shall be limited to a maximum installation depth of 200 feet. Specifications for wall thickness and for diameter of polyvinyl chloride plastic pipe (PVC), ASTM D 1785, NSF-approved, are given in Table 1.

Plastic well casing made of virgin, white, high-impact, rubber-modified polystyrene material; such as Dow Chemical Company Styron 456 or Cosden 825-D or equal; shall be limited to an installation depth of 300 feet. Specifications for thickness by diameter of such polystyrene plastic casing are given in Table 2.

3. SCREENS

All wells finished in unconsolidated aquifers shall be equipped with manufactured screen sections, well points or field perforated sections meeting the criteria stated below.

The screen openings for aquifer material of near uniform size shall be slightly smaller than the average diameter of the aquifer material. For graded aquifer materials (of non-uniform gradation), the screen openings shall be such that 25 to 40 percent of the aquifer material is larger than the screen opening. In wells using a gravel pack envelope, the screen shall have openings of a size that will exclude at least 85 percent of the gravel pack material. The length and open area of the screen shall be sufficient to maintain the entrance velocity of water into the well at an acceptable level, preferably less than 1/10 foot per second.

The position of the screen in the well will be governed by the depth of the aquifer below the ground surface and the thickness of aquifer to be penetrated by the well. Where practical, the top elevation of the screen should be below the lowest water level expected during pumping and be located opposite the most permeable areas in the water-bearing strata.

4. GRAVEL PACK

Filter packs will be used in wells developed in strata composed of fine material of relatively uniform grain size to prevent aquifer materials from passing through the well screen or perforated casing. The pack shall be 3 to 12 inches thick and shall be composed of sand or gravel material having a grain size 5 to 12 times the grain size of the strata material.

When gravel packing is used, it shall be of the specified gradation and thickness and shall be carefully placed to prevent segregation and bridging. Gravel pack materials shall extend a minimum of 10 feet above the top of the perforated or screened section and extend through the length of the water-bearing formation.

5. SANITARY PROTECTION

Groundwater sources should be located a safe distance from sources of contamination. The well shall be located on ground that is higher than any source of contamination. Drainage that might reach the source from areas used by livestock should be diverted.

Each well shall be provided with a watertight cover or seal to prevent contaminated water or other objectionable material from entering the well. The annular space around the casing shall be filled with cement grout, bentonite clay or other suitable material from the surface to a minimum of 10 feet below the ground surface. A positive seal shall be provided between the casing and the impervious material overlying the aquifer or artesian wells. A sanitary well seal shall be installed at the top of the well casing to prevent the entrance
of contaminated water or other objectionable material.

6. ALIGNMENT

Drilled wells shall be round, plumb and aligned so as to permit satisfactory installation and operation of a pump of the proposed size and type, to the greatest anticipated depth of setting.

7. CASING INSTALLATION

In consolidated formations, the casing shall extend from the ground surface through the overburden material to an elevation at least 2 feet into the consolidated foundation.

In unconsolidated formations, the casing shall extend from the ground to the screen.

For artesian aquifers, the casing shall be sealed into the overlying impermeable formations so as to retain the artesian pressure.

When a water-bearing formation containing water of poor quality is penetrated, the formation shall be sealed off to prevent the infiltration of poor quality water into the well and the developed aquifer.

Plastic well casing shall be equipped with a steel driving shoe and shall be placed with very little driving.

8. DEVELOPING

The well shall be developed until it has stopped producing detrimental quantities of sand when the continuous discharge rate is approximately 20 percent greater than the anticipated normal production rate.

9. SIZE OF PLASTIC CASING

Plastic well casings shall be no larger than 6 inches diameter, nominal.

10. JOINTS IN PLASTIC CASING

Joints shall be other than screw type.

TABLE 1 - POLYVINYL CHLORIDE (PVC) PIPE FOR WELL CASING (Entries in Inches)

Nominal Size	Outside Diameter	Inside Diameter	Minimum Wall Thickness	Outside Diameter	Inside Diameter	Minimum Wall Thickness
	PVC 1220 - SCHEDULE 40			PVC 1220 - SCHEDULE 80		
1 1/2	1.900	1.620	0.145	1.900	1.500	0.200
2	2.375	2.067	0.154	2.375	1.939	0.218
2 1/2	2.875	2.469	0.203	2.875	2.323	0.276
3	3.500	3.068	0.216	3.500	2.900	0.300
4	4.500	4.026	0.237	4.500	3.826	0.337
6	6.625	6.065	0.280	6.625	5.761	0.432

TABLE 2 - HIGH-IMPACT, RUBBER-MODIFIED POLYSTYRENE PIPE FOR WELL CASING

Nominal Diameter (Inches)	Minimum Wall Thickness (Inches)
4	0.220
5	0.250
6	0.300